II. The Setting

There are fourteen ecoregions in Massachusetts (**Table 1** and **Figure 1**), based on recent revisions of the USDA Forest Service "subsection" boundaries. The USDA FS is continuing to refine/revise the ecosystem classification system including: naming conventions and boundaries of the sections, subsections, and land type associations. The ecoregions range in size from approximately 32 square miles (Southern Green Mountain) to more than 1600 square miles (Gulf of Maine Coastal Plain) (**Table 1**).

Table 1. Information on Massachusetts' Ecoregions[1].

Ecoregion	Acres	Sq. Miles	% of Total
Berkshire-Vermont Upland	433,948	678	8%
Boston Basin	204,388	319	4%
Cape Cod Coastal Lowland And Islands	517,667	809	10%
Connecticut River Valley	339,598	531	7%
Gulf Of Maine Coastal Lowland	186,764	292	4%
Gulf Of Maine Coastal Plain	1,024,308	1,600	20%
Hudson Highlands	304,920	476	6%
Berkshire Transition Association	*229,616*	*359*	*4%*
Western New England Marble Valley Association	*75,304*	*118*	*1%*
Lower Worcester Plateau	681,633	1,065	13%
Narragansett-Bristol Lowland And Islands	586,635	917	11%
Southeast New England Coastal Hills And Plain	233,905	365	5%
Southern Green Mountains	20,500	32	0.4%
Southern Vermont Piedmont	138,574	217	3%
Taconic Mountains	236,068	369	5%
Taconic Highlands Association	*81,519*	*127*	*2%*
Western New England Marble Valley Association	*154,549*	*241*	*3%*
Worcester-Monadnock Plateau	270,439	423	5%
Totals:	5,179,350	8,093	100%

Source: MassGIS / DCR

[1] Area figures are based on the latest revision of USFS ecoregion boundaries. Slight modifications of these boundaries may still be made in the future.

The five (5) Berkshire Ecoregions, of western Massachusetts, represent approximately 22% (~1,134,000 acres) of the total land area (~5,180,000 acres) of the Commonwealth. They consist of the: Berkshire-Vermont Upland (~434,000 acres), Hudson Highlands (~305,000 acres), Taconic Mountains (~236,000 acres), Southern Vermont Piedmont (~139,000 acres), and the Southern Green Mountains (~21,000 acres) depicted in **Figure 2**. They are the 5th, 7th, 9th, 12th and 14th (last) in size, respectively, of the 14 ecoregions in Massachusetts. The Taconic Mountains includes two distinct "Land Type Associations": the "Taconic Highlands" (~82,000 acres) and the "Western New England Marble Valley" (~155,000 acres) Associations. The Hudson Highlands also includes two distinct "Land Type Associations: "Berkshire Transition" (~230,000 acres) and "Western New England Marble Valley" (~75,000 acres) Associations. The Land Type Associations are also depicted in **Figure 2**. As previously mentioned in the introduction the University of Massachusetts

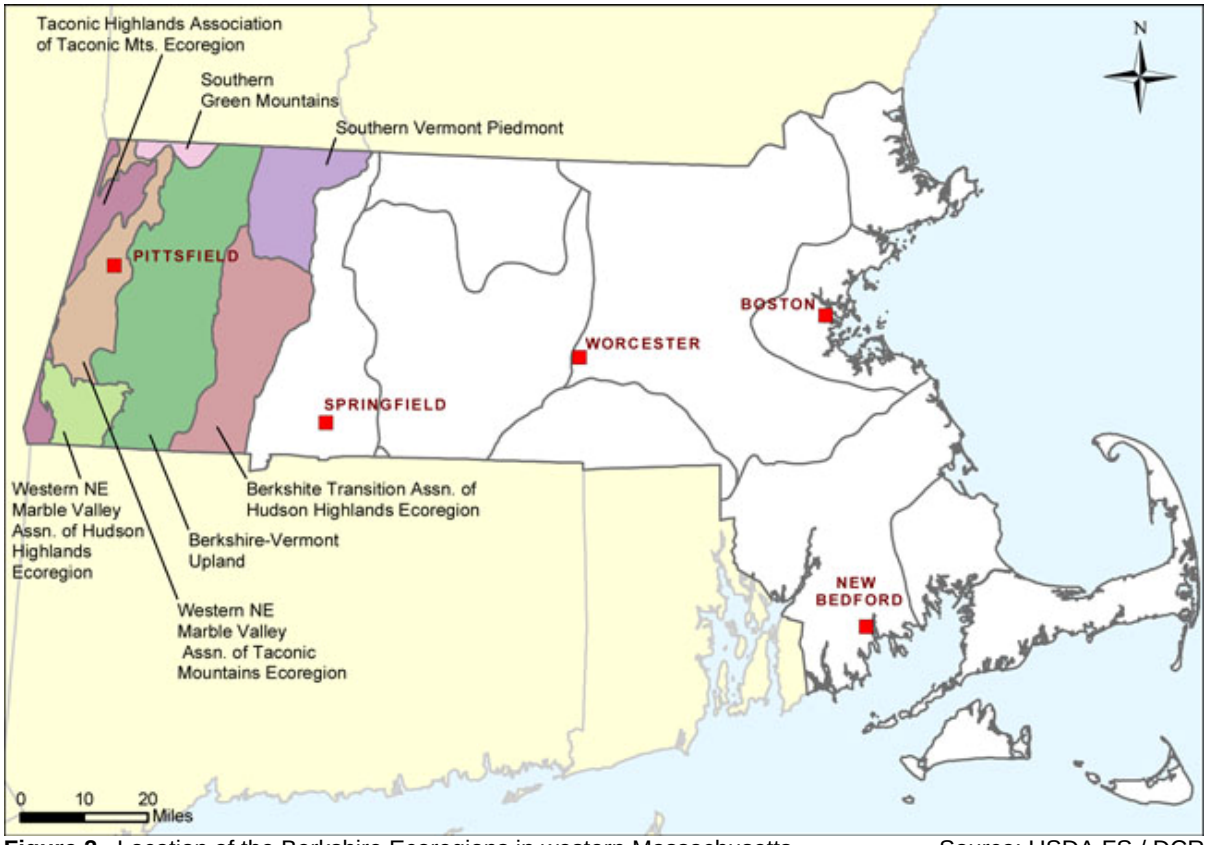

Figure 2. Location of the Berkshire Ecoregions in western Massachusetts Source: USDA FS / DCR

The following **tables** display the ecological classification cover according to Bailey, 1995; **2a** Province, **2b** Landforms, **2c** Elevation, and **2d** Climate for the Ecoregions (5) and Land Type Associations (4) of the Berkshires:

Table 2a.

Ecoregion	Province
Berkshire Vermont Upland	Adirondack-New England Mixed Forest–Coniferous Forest-Alpine Meadow
Hudson Highlands	Eastern Broadleaf Forest (Oceanic)
Southern Vermont Piedmont	Adirondack-New England Mixed Forest–Coniferous Forest-Alpine Meadow
Southern Green Mountains	Adirondack-New England Mixed Forest–Coniferous Forest-Alpine Meadow
Taconic Mountains	Adirondack-New England Mixed Forest–Coniferous Forest-Alpine Meadow

Table 2b

Ecoregion / *Land Type Association*	**Landform**
Berkshire Vermont Upland	Open, low, ice-scoured mountains
Hudson Highlands	
Berkshire Transition Association	Open high hills
W. New England Marble Valley Association	Steep-sided valleys & open high hills
Southern Vermont Piedmont	Open high hills
Southern Green Mountains	Low ice-scoured mountains
Taconic Mountains	
Taconic Highlands Association	Low ice-scoured mountains
W. New England Marble Valley Association	Steep-sided valleys

Table 2c.

Ecoregion	Elevation
Berkshire Vermont Upland	500-2,500 ft.
Hudson Highlands	
Berkshire Transition Association	180-1800 ft.
W. New England Marble Valley Association	590-1700 ft.
Southern Vermont Piedmont	400-1,200 ft.
Southern Green Mountains	1,000-3,500 ft.
Taconic Mountains	.
Taconic Highlands Association	1050-3500 ft.
W. New England Marble Valley Association	500-2500 ft.

Table 2d.

Ecoregion	Climate (temps, precip.)
Berkshire Vermont Upland	Annual average of 48" precipitation, 45°F, 143 day growing season
Hudson Highlands	Annual average of 46" precipitation, 50°F, 165 day growing season
Southern Vermont Piedmont	Annual average of 40" precipitation, 45°F, 143 day growing season
Southern Green Mountains	Annual average of 48" precipitation, 45°F, 143 day growing season
Taconic Mountains	Annual average of 42" precipitation, 45°F, 135 day growing season

The Berkshire Ecoregions are split between the "**Eastern Broadleaf Forest (Oceanic) Province"** and the "**Adirondack-New England Mixed Forest–Coniferous Forest-Alpine Meadow Province".**

The Hudson Highlands Ecoregion (USDA FS / Subsection) is in the Eastern Broadleaf Forest (Oceanic) Province of the "**Lower New England Section**", of the USDA Forest Service ecoregion classification system (Bailey, 1995). East of the Appalachian Mountains in the Piedmont Plateau and costal plains landforms are mostly hilly, with elevations ranging from sea level to about 1000 feet, with occasional higher monadnocks. Elevations range from about 180 to 1,800 feet in the Berkshire Transition Association and about 590 to 1,700 feet in the Western New England Marble Valley Association (**Figure 3**). The continental climate regime ensures a strong annual temperature cycle (average annual temperature 40 to 60◦F), with cold winters and warm summers. There is year-round precipitation (35 to 60 inches/year), which is markedly greater in summer months.

This Province is characterized by a temperate deciduous forest, dominated by tall broadleaf trees that provide a dense continuous canopy in summer and shed their leaves completely in winter. Lower layers of small trees and shrubs develop weakly. In spring, a luxuriant ground cover of herbs quickly develops, but is greatly reduced after trees reach full foliage and shade the ground. Soils are characteristically Alfisols (i.e., soils that have a clay and nutrient-enriched subsoil). In deciduous forest areas, a thick layer of leaves covers the ground and humus is abundant.

The Lower New England Section is characterized by northern hardwoods and northeastern oak-pine vegetation types. The growing season generally ranges from 120-180 days. Water resources are abundant, with generally low (but locally steep) stream gradients. Disturbance regimes in the region include intermediate to high occurrences of fire and hurricane winds. Modern forest characteristics are strongly influenced by land use, particularly agricultural use dating from colonial times and subsequent farm abandonment. A number of insect and disease disturbances also affect the forest in this Section.

The Hudson Highlands (i.e., the Hudson Highlands Ecoregion in this document) consist of open high hills with steep sided valleys and an elevation between 1000 – 1500 feet. Soil types include Dystrochrepts, Epiaquepts, and Udorthents. Precipitation averages 46 inches per year with a mean annual temperature of 50°F and a 160 day growing season. There are many glacial lakes in the region, few large streams and some reservoirs. Potential vegetation types in this subsection (using USDA FS classifications) include hemlock-white pine, red oak – white pine, and sugar maple - chinquapin oak

forests. Included in this ecoregion are two Land Type Associations, the Western New England Marble Valley Association and the Berkshire Transition Association.[1]

The Taconic Mountains, Berkshire-Vermont Uplands, Southern Green Mountains, and Southern Vermont Piedmont Ecoregions (USDA FS / Subsections) are all in the Adirondack-New England Mixed Forest–Coniferous Forest-Alpine Meadow Province. The Taconic Mountains, Berkshire-Vermont Uplands, and the Southern Green Mountains are in the "**Green, Taconic, Berkshire Mountain Section**" and the Southern Vermont Piedmont is in the "**New England Piedmont Section**". The province features subdued glaciated mountains and maturely dissected plateaus, underlain by granite and metamorphic rock and thinly mantled by glacial till, of mountainous topography. Valleys contain glacial outwash deposits and numerous swamps and lakes. Elevations range from 500 to 4,000 feet.

This Province is characterized as a transition zone between the boreal spruce-fir forest of the north and the deciduous forest to the south. Many species are found that are also found in the north, but red spruce tends to replace white spruce. Harwood forests with a mixture of hemlock are found in the valleys. A mixed forest of spruce, fir, maple, beech, and birch are found on low mountain slopes. The climate, a continental forest type, has warm summers and the potential for severely cold winters. Temperatures range from 37 to 52 ^{0} F per year and precipitation averages 35 in. per year. Snowfall can average greater than 100 in per year.

The Green, Taconic, Berkshire Mountain Section is characterizes by northern hardwood, northern hardwood-spruce, and northeastern spruce-fir forest and includes regionally-defined important vegetation types such as northern hardwood-conifer and transition hardwood-conifer. The growing season generally ranges from 80-130 days. Perennial streams and small lakes provide an abundance of water resources. The streams have gradients that range from low to steep and are generally incised. Disturbance regimes include occurrences of fire and hurricane winds in the region and range from relatively frequent in the south to very low in the north. The structure and composition of today's forest in this region, on a landscape scale, is heavily influenced by past land use, particularly agricultural use dating from colonial times, subsequent farm abandonment, and past logging practices of certain species. Soil cation depletion and a number of insect and disease disturbances also affect the forest in this Section.

The Taconic Mountains consist of low ice-scoured mountains, with elevations between 500 – 3,500 feet. Soil types include Dystrochrepts, Eutrochrepts, Haplorthods, and Udipsamments. Precipitation averages 42 inches per year with a mean annual temperature of 45^{o}F and a 135 day growing season. The rivers and stream have low – moderate gradients, with few ponds, lakes and large wetlands in the region. Potential vegetation types in this subsection include red spruce-balsam fir, sugar maple-birch-beech, and oak-hickory-ash forests. Included in the Taconic Mountains are two Land Type Associations, the Western New England Marble Valley Association and the Taconic Highlands Association. [1]

The Berkshire-Vermont Uplands consist of open low ice scoured mountains, with elevations between 500 – 2,500 feet. Soil types include Dystrochrepts, Eutrochrepts, Haplorthods, and Udipsamments. Precipitation averages 48 inches per year with a mean annual temperature of 45^{o}F and a 143 day growing season. Rivers and streams are moderately steep, with few lakes and impoundments in the region. Potential vegetation types in this subsection include sugar maple-birch-beech, red spruce-balsam fir, oak-hickory-ash, and oak-pine forests.

[1] A study is currently being conducted by the University of Massachusetts through a contract with the USDA Forest Service to further analyze the characteristics of the Land Type Associations of the Hudson Highlands and the Taconic Mountain Ecoregions (subsections). This study will further identify the characteristics of the Berkshire Plateau. The conclusions of the study may lead to refinements of the ecoregion and land type association boundaries.

The Southern Green Mountains consist of low ice scoured mountains, with elevations between 1,000 – 3,500 feet. Soil types include Haplorthods. Precipitation averages 48 inches per year with a mean annual temperature of 45°F and a 143 day growing season. The region contains impoundments, high elevation streams and ponds, and wetlands are common. Potential vegetation types in this subsection include sugar maple-birch-beech, red spruce-balsam fir, oak-hickory-ash, and oak-pine forests.

The New England Piedmont Section is characterized by is characterizes by northern hardwood, northern hardwood-spruce forest and includes regionally-defined important vegetation types such as northern hardwood-conifer and transition hardwood-conifer. The growing season generally ranges from 110-160 days. Perennial streams are important water resources. These streams have gradients that range from low to moderate to steep and are generally incised. Disturbance regimes include occurrences of fire and hurricane winds in the region and range from relatively frequent in the south to very low in the north. The structure and composition of today's forest in this region, on a landscape scale, is heavily influenced by past land use, particularly agricultural use dating from colonial times, subsequent farm abandonment, and past logging practices of certain species. Soil cation depletion and a number of insect and disease disturbances also affect the forest in this Section.

The Southern Vermont Piedmont consists of open low mountains with elevations between 500 – 2,500 feet. Soil types include Haplorthods, Fragiorthods, Humaquepts, Haplaquepts, and Dystroquepts. Precipitation averages 39 inches per year with a mean annual temperature of 42°F and a 114 day growing season. There are few large wetlands, but small – medium rivers, streams and small lakes are common in the region. Potential vegetation types in this subsection include sugar maple-birch-beech and northern red oak-hardwood mesic forests, red spruce-balsam fir forests, and northern white cedar limestone woodlands.

Additional information on Ecosystem Classification
USDA Forest Service / IMI / Ecoregions Center: ***www.fs.fed.us/institute/ecolink.html*** ...
USDA Forest Service / Ecological Subregions of the United States**:*****www.fs.fed.us/land/pubs/ecoregions/***

The Berkshire Ecoregions include seventy (70) communities with sixty (60) communities within and ten (10) communities partially within the ecoregions as depicted in **Figure 4**. These seventy communities are within 4 counties (Berkshire, Franklin, Hampden, and Hampshire) as depicted in **Figure 5**. There are six (6) Major River Basins (Hudson, Housatonic, Deerfield, Westfield, Farmington, and Connecticut) as depicted in **Figure 6**.

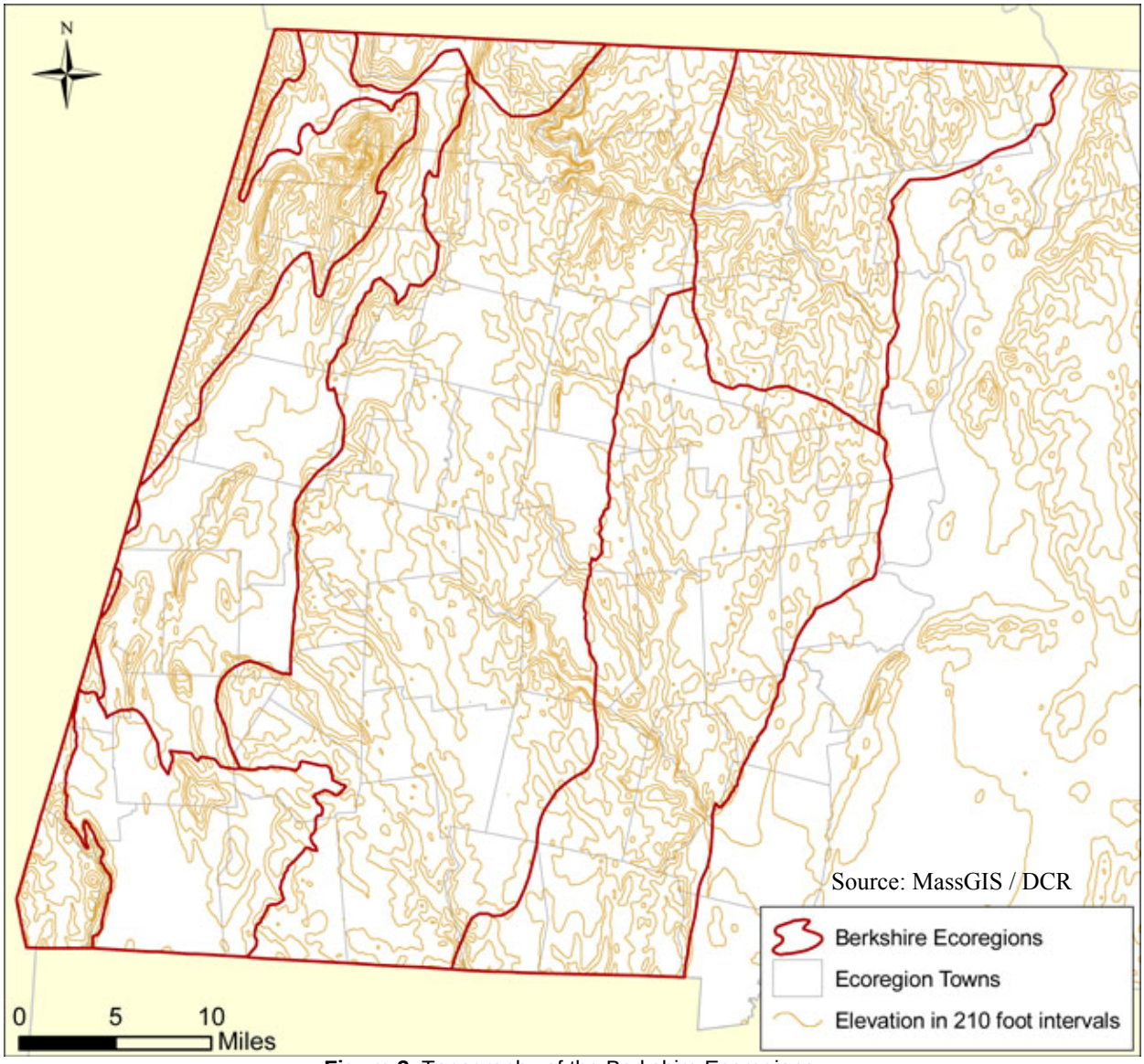

Figure 3. Topography of the Berkshire Ecoregions.

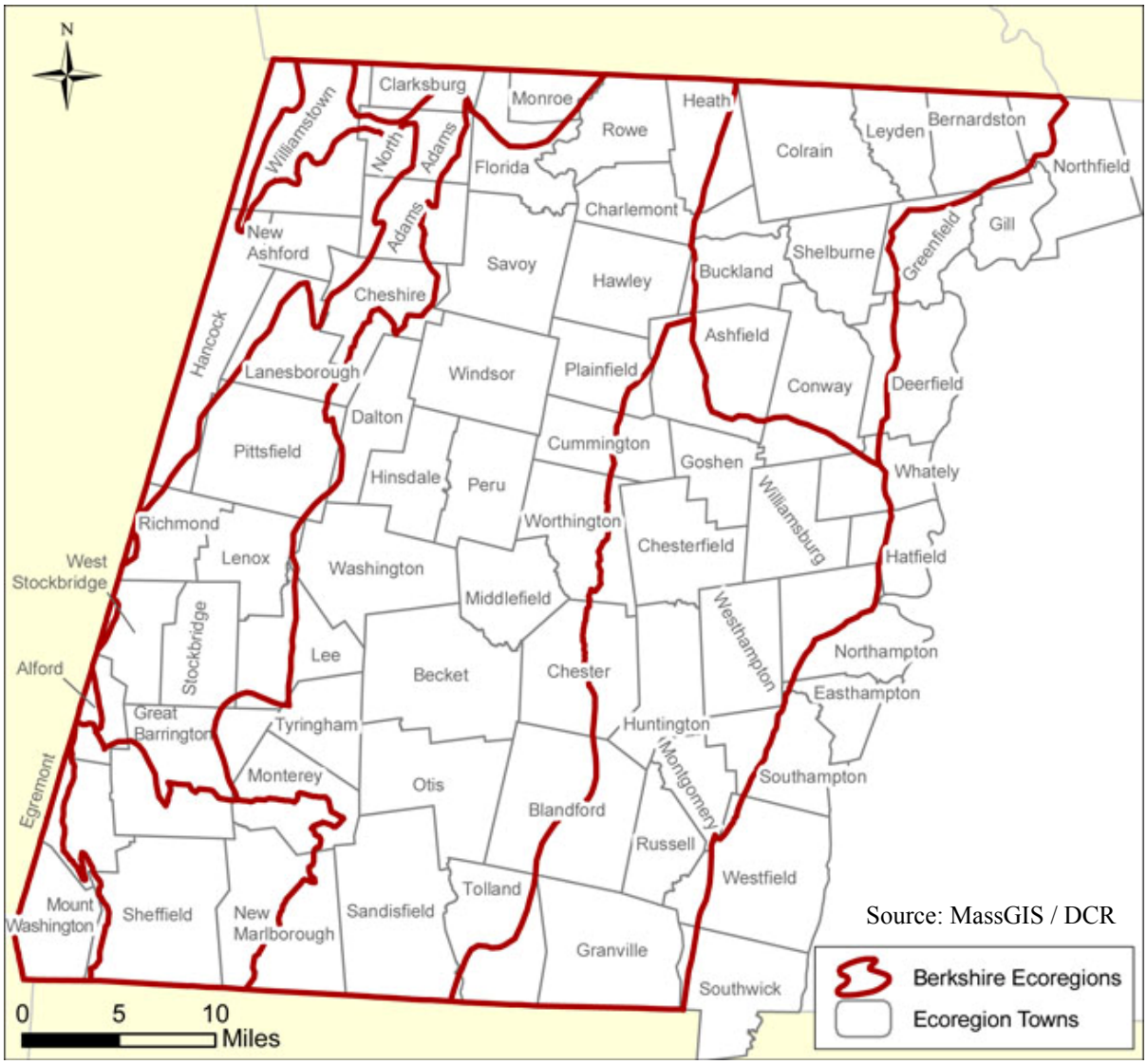

Figure 4. Communities in the Berkshire Ecoregions.

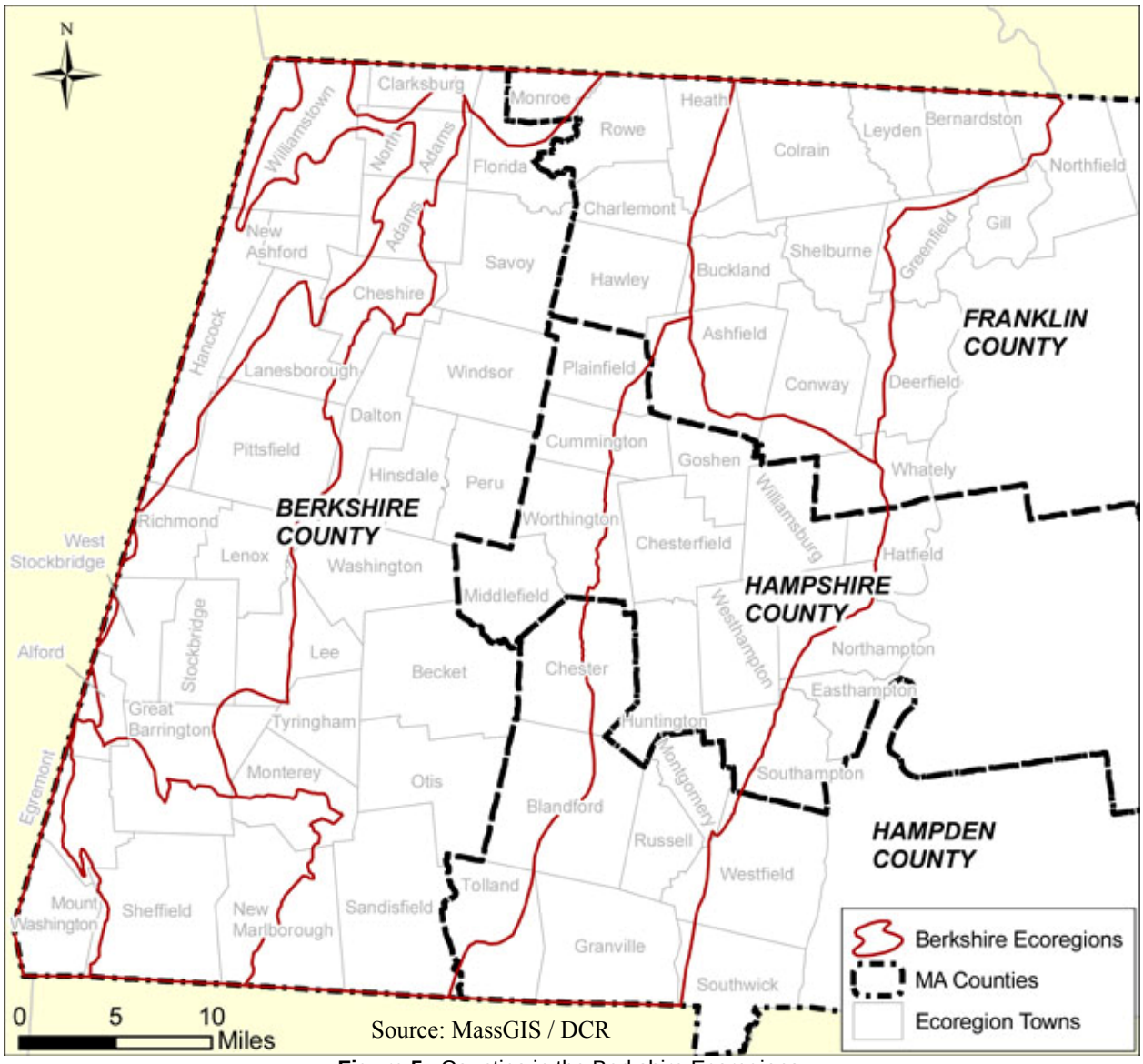

Figure 5. Counties in the Berkshire Ecoregions.

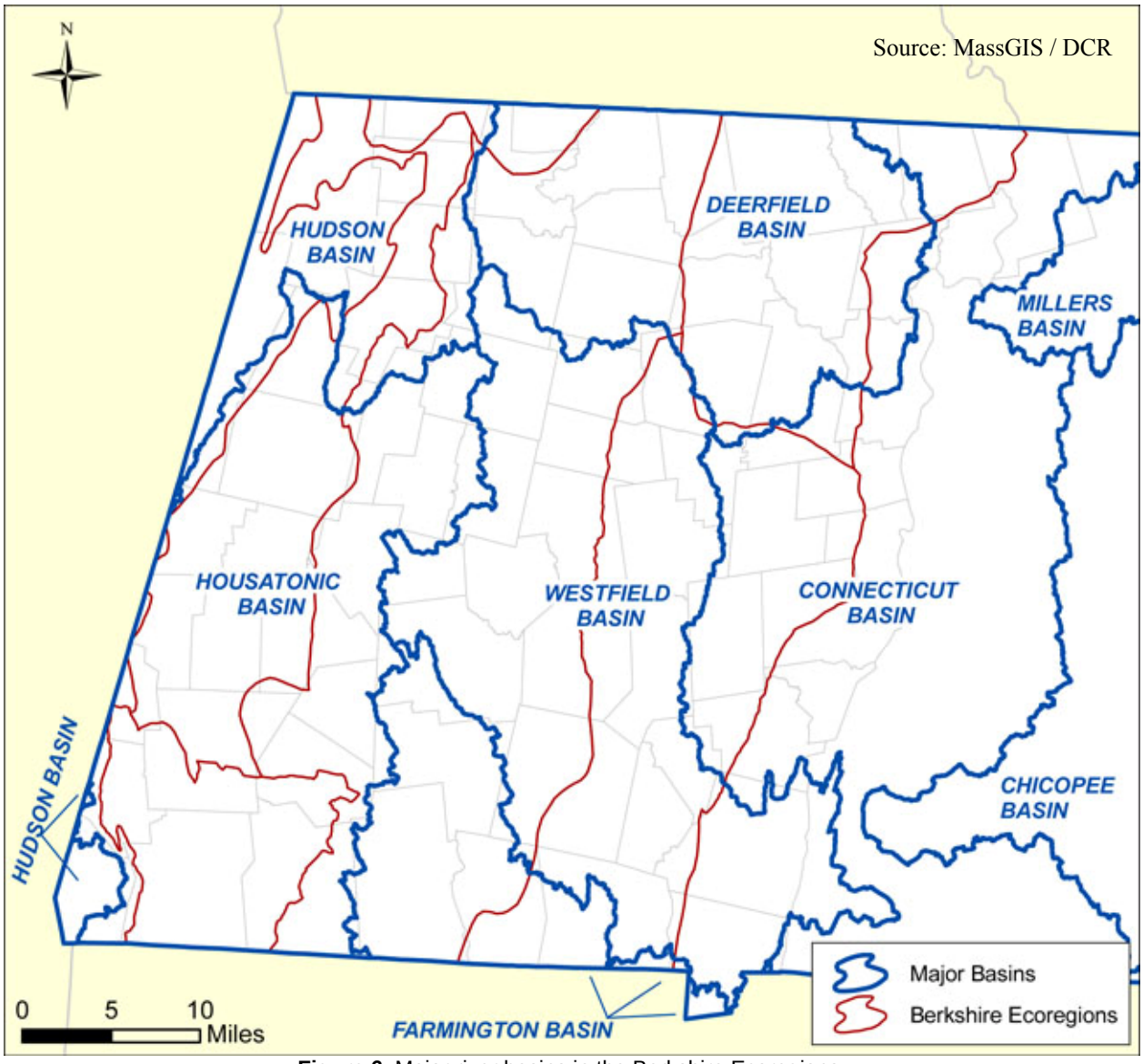

Figure 6. Major river basins in the Berkshire Ecoregions.

The Berkshire Ecoregions are largely rural, with almost 80% of its land area classified as "forest cover" (**Tables 3**). Just under 8% of the Berkshire Ecoregions was "developed", just under 10% was "agriculture/open", and just over 3% was "water/wetlands" as of 1999 (**Table 4 and Figure 7**). Additional landuse information (tables and figures) for each of the Berkshire Ecoregions / Land Type Associations is provided in **Appendix II**.

Table 3. Forest Cover in the Berkshire Ecoregions, 1985 and 1999. Source: MassGIS / DCR

Ecoregions (*Associations*)	**Total Area**	**1985 Forest**	**1999 Forest**	**Change**	**1985**	**1999**	**Change**
	(acres)				**%**		
Taconic Mountains	236,068	155,969	156,461	492.31	66.07%	66.28%	0.32%
(Taconic Highlands)	*81,519*	*72,726*	*72,681*	*-45.00*	*89.21%*	*89.16%*	*-0.06%*
(W. New England Marble Valley)	*154,549*	*83,243*	*83,781*	*538.00*	*53.86%*	*54.21%*	*0.35%*
Hudson Highlands	304,920	241,844	239,921	-1,922.63	79.31%	78.68%	-0.79%
(Berkshire Transition)	*229,616*	*195,724*	*194,284*	*-1,440.00*	*85.24%*	*84.61%*	*-0.74%*
(W. New England Marble Valley)	*75,304*	*46,120*	*45,637*	*-483.00*	*61.25%*	*60.60%*	*-1.05%*
Berkshire-Vermont Upland	433,948	377,097	374,492	-2,605.00	86.90%	86.30%	-0.69%
Southern Vermont Piedmont	138,574	107,966	107,193	-773.00	77.91%	77.35%	-0.68%
Southern Green Mountains	20,500	18,813	18,783	-30.00	91.77%	91.62%	-0.16%
Totals	113,4010	901,689	896,850	-4,839.00	79.51%	79.09%	-0.54%

Table 4. Landuse by 4 Major Class Groups (Berkshire Ecoregions)

	1985		**1999**		**1985-1999**
Landuse	**Acres**	**%**	**Acres**	**%**	**% change**
Ag/Open	118,299	10.4%	109,547	9.7%	-7.4%
Forest	901,689	79.5%	896,850	79.1%	-0.5%
Developed	76,443	6.7%	89,556	7.9%	17.2%
Water/Wet	37,566	3.3%	38,043	3.4%	1.3%
Missing data	14	0.0%	14	0.0%	0.0%
Totals:	1,134,011	100.0%	1,134,010	100.0%	

Source: MassGIS / DCR

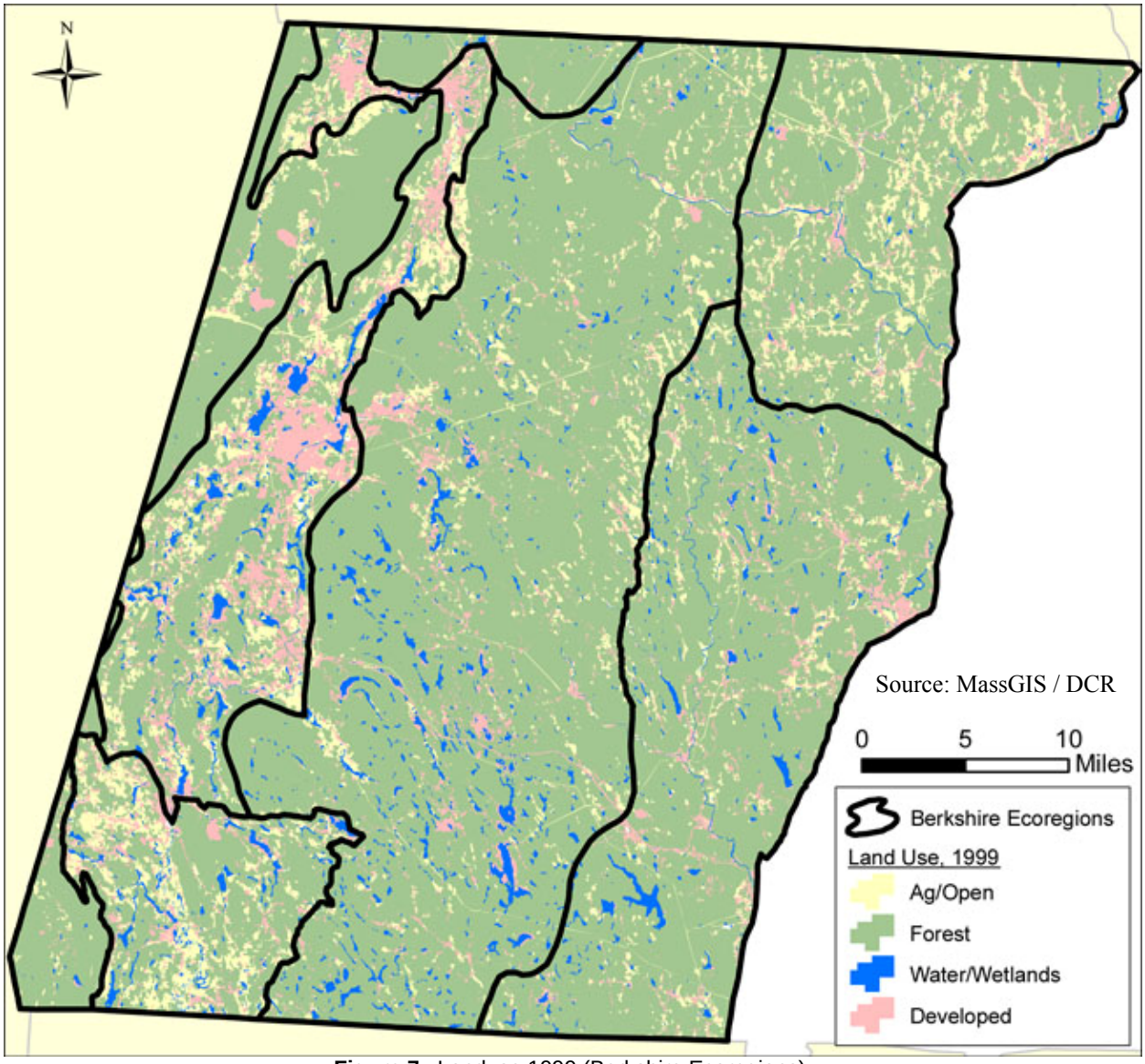

Figure 7. Landuse 1999 (Berkshire Ecoregions).